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Newark Energy Center

Consolidated Alternative Site Information and Screening Analysis

April 2013

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Our Ref.:
WI001311.0001

Date:
April 2013

Tables

Figures (following text):

1. Introduction

1.1 General Background

Hess NEC, LLC (Hess NEC) is a joint venture between Hess Corporation (Hess) and Energy Investors Fund (EIF), in which each owns an equal interest. Hess NEC submitted an application (Permit Application) on October 6, 2011 to the New Jersey Department of Environmental Protection (NJDEP) for a Prevention of Significant Deterioration and Nonattainment New Source Review Permit, Title V Operating Permit, and Phase II Acid Rain Permit to construct and operate the Newark Energy Center (NEC), a nominal 655-megawatt (MW) combined cycle electric generating facility in Newark, New Jersey. The purpose of this project is to provide a lower cost supply of electricity to respond to Northeast New Jersey regional energy needs using only clean-burning natural gas technology

Hess NEC continued to provide additional information as requested until NJDEP deemed the application complete and issued a draft permit for the NEC project on June 26, 2012. NJDEP provided for a 45-day public comment period and public hearing, in which additional information was introduced into the administrative record for NJDEP's consideration. NJDEP prepared a Hearing Officer's Report and Response to Public Comments (Response to Comments) and the final permit for the NEC project on September 13, 2012 (the NEC Permit).

1.2 Alternatives Analysis in the Permit Application

1.2.1 Regulatory Requirements

Applicable New Jersey regulations for Nonattainment New Source Review provide that an applicant:

> "Submit to the Department an analysis of alternative sites within New Jersey, and of alternative sizes, production processes, including pollution prevention measures, and environmental control techniques, demonstrating that the benefits of the newly constructed, reconstructed, or modified equipment significantly outweigh the environmental and social costs imposed as a result of the location, construction, reconstruction or modification and operation of such equipment." N.J.A.C. 7:27-18.3(c)(2).

This requirement is a balancing test, where no one factor predominates in determining whether the project's benefits outweigh its costs and thus should receive a permit under Subchapter 18.

Furthermore, because it is a requirement imposed only upon proposed major sources in areas that are designated as nonattainment with respect to the National Ambient Air Quality Standard (NAAQS), each of these factors must be viewed from the perspective of whether there are alternatives that have a greater or lesser effect on attainment of the NAAQS. It is important in this context to keep in mind that the NEC facility required a permit under Subchapter 18 for only ozone, regulated in the form of ozone precursor pollutants, nitrogen oxides (NO_x) and volatile organic compounds (VOC). The entire state of New Jersey is in designated as nonattainment with respect to the ozone NAAQS.

1.2.2 Permit Application Alternatives Analysis

The Permit Application included the alternatives analysis information required by N.J.A.C. 7:27-18.3(c)(2). Table 1 shows where the relevant information was provided in the Permit Application.

Table 1. Permit Application Alternatives Analysis Information

Information	Section(s)	Page(s)
Alternative sites	2.7.1	2-15
Alternative sizes	2.7.2	2-15
Alternative production processes, including pollution prevention measures	2.7.3	2-16
Environmental control techniques	4.3 to 4.9	4-6 to 4-24

A summary of the information in the Permit Application relating to alternatives analysis is provided in the following paragraphs.

1.2.2.1 Alternative Sites

The NEC site was selected by Hess NEC because it met a series of criteria that make it possible to build an economically viable facility to supply the constrained northern New Jersey power market. It is zoned industrial and in an area surrounded by other industrial land uses and is well removed from residential areas. It is close to an adequate and easily accessible gas supply and an interconnection point (the Public

Service Electric and Gas Company [PSEG] Essex Substation). The site has a readily available supply of cooling water from recycled water.

Many of these site characteristics are extremely rare. For example, there are relatively few locations in New Jersey zoned for heavy industrial use where power plants are an allowable use. Newark's zoning plan, discussed in Section 2.2.1.2, specifically states this as a reason why Newark zoning allows industrial use where the project is located. When all of these characteristics are considered together, very few sites which could serve the constrained North Jersey market are expected to be suitable.

Prior to submittal of the Permit Application, Hess NEC's owners had reviewed two other potential sites in New Jersey for power generation facilities: Pennsauken, and Port Reading. Hess NEC's owners also subsequently considered two additional alternate sites: Ringwood and Kearny. These reviews were instrumental to the decisions by Hess and EIF to proceed with the NEC project rather than an alternative site. The reasons why these alternate sites were not considered as suitable as the proposed site are discussed in more specific detail in this Consolidated Alternative Site Information and Screening Analysis, and relate to the same factors discussed more generally in the Permit Application.

It is important in this context to consider the fact that because of the regional nature of ozone pollution, and the designation of the entire state as nonattainment with respect to the ozone NAAQS, there is no alternative site that would be superior with respect to impact on attainment of the NAAQS. The NJDEP Response to Comments recognizes this as one factor it relied upon for issuance of the permit.

1.2.2.2 Alternative Sizes

The NEC project is a combined cycle power plant using two F-Class combustion turbines. The two units will operate independently, with each unit capable of generating approximately 211 MW (nominally). Electricity demand changes significantly, based on factors like time of day or year and weather conditions. Two independently operating turbines provide the project with more flexibility to respond to changing electric demand conditions.

Larger class turbines, because of their increased size, provide less operating flexibility. Smaller turbines (aero-derivatives) cannot match F-Class turbines' superior environmental performance (emissions/MW-hr of electricity generated). Hess NEC also considered projects with fewer and greater numbers of units. A project with one

unit, while having commensurately lower emission levels, would not be economic. A project with three or more units would exceed infrastructure and site space limitations.

1.2.2.3 Alternative Production Processes

Electricity production process alternatives considered included simple cycle combustion turbine technology and conventional boiler technology. Simple cycle turbines and conventional boilers are not as efficient as combined cycle units in terms of both energy (MW per Btu of fuel) and environmental (emissions per MW) efficiency. Simple cycle technology is typically applied to meet intermittent or peak electrical demand and is not suitable for base load demand, which the NEC project is designed to meet. Boilers also consume considerably more water for the same electrical output than combined cycle turbine technology.

1.2.2.4 Environmental Control Techniques

Federal and New Jersey regulations impose stringent emissions control technology requirements, including: Lowest Achievable Emission Rate (LAER), which applies to nonattainment pollutants for which the project is a major source; Best Available Control Technology (BACT), which applies to attainment pollutants for which the project is a significant emissions source; and State of the Art Technology (SOTA) which applies to all New Jersey-regulated pollutants.

As a result of these requirements, the Permit Application reviews in great detail environmental control alternatives for regulated pollutants, including comprehensive LAER, BACT and SOTA analyses. Because the only pollutants to which the alternative analysis applies are VOC and NO_x as ozone precursors, this section focuses on those control technologies applicable to those pollutants for the key emissions units.

With regard to NO_x and VOC, Hess NEC reviewed control technologies and permit limits approved as LAER for the emissions units that are part of the project. For NO_x from the combustion turbines and duct burners, Hess NEC selected dry low-NO_x burners in combination with Selective Catalytic Reduction (SCR). For VOC, Hess NEC selected efficient combustion in combination with an oxidation catalyst system. These are the most stringent control technologies available for ozone precursors, and result in emissions limits comparable to the lowest rates achieved in practice, which represent LAER for those pollutants.

The NEC project also incorporates the most stringent emissions controls available for all other regulated pollutants, including oxidation catalyst systems, which represent BACT and SOTA for carbon monoxide; good combustion practices and exclusive use of pipeline-quality natural gas, which represent BACT and/or SOTA for particulates and sulfur dioxide (SO_2); and state-of-the-art combined cycle technology, which represents BACT for greenhouse gas emissions.

1.2.2.5 Other Information Relevant to Alternatives Analysis

As part of the Permit Application, Hess NEC submitted a Dispersion Modeling Report on November 10, 2011 and a revised Dispersion Modeling Report on May 1, 2012. The Dispersion Modeling Report included a comprehensive air quality modeling impact analysis and other information which demonstrated that the impact of the NEC project on the surrounding communities was *de minimis*. This information appears in Section 3.2.2 and Section 5 of the Dispersion Modeling Report.

The Permit Application also references the purpose of the NEC project to provide lower cost power from clean burning natural gas. Additional information was introduced into the administrative record regarding project benefits. These include displacement of emissions from older, less efficient and higher emitting plants, construction and operation employment, emissions offsets, and grants to the City of Newark for environmental and social benefit programs.

1.3 NJDEP Response to the Permit Application and Alternatives Analysis

The NJDEP carefully considered the information in the Permit Application and contained in public comments. The September 13, 2012 Hearing Officer's Report and Response to Public Comments (Response to Comments) on the NEC project addressed in detail the alternative analysis requirements that apply, including the alternatives to siting of the NEC facility. This discussion appears in Section D (pages 22 to 24) of the Response to Comments. Additional information was provided in Section E-1. Discussions of the benefits of the project from an air quality, social and economic perspective appear in Sections C, D, N and Q of the Response to Comments. NJDEP concluded based on the record as follows:

> "Therefore, considering the purpose of N.J.A.C. 7:27-18.3(c)(2) and the information provided to the Department, the Department believes that Hess satisfied the alternative sites analysis requirement."

Hess NEC concurs that the Permit Application satisfied all of the alternatives analyses required by New Jersey regulation and that the NEC project meets the requirement to demonstrate that the benefits of the project outweigh its costs.

1.4 Purpose of this Consolidated Alternative Site Information and Screening Analysis

NEC has prepared this Consolidated Alternative Site Information and Screening Analysis to provide to NJDEP and the public a consolidated and more expansive explanation of information in the Permit Application, permit decision record and public record regarding the availability, feasibility and potential environmental and community impacts of alternative sites within New Jersey. Among its major purposes are to

1. Summarize the Alternatives Analysis process and information provided in the Permit Application.

2. Consolidate in a single document information already in the permit decision record or other documents of public record about electricity markets, land availability, critical plant infrastructure, the LCAPP process, zoning practices, environmental impacts and other relevant information as they relate to consideration of alternatives to the Newark site for the NEC project.

3. Elaborate upon the information provided in the Permit Application about alternatives to the selected site in Newark that were considered by the principals in Hess NEC.

Hess NEC is providing this consolidated and elaborated information as a matter of public interest. This document fully supports NJDEP's original determination that a permit should be issued for the NEC project and that the Permit Application appropriately considered the alternatives analysis criteria in Subchapter 18.

Section 1.4., subparagraph 1. above, is addressed in Sections 1.2 and 1.3 of this document. The information referred to in Section 1.4., subparagraph 2. above, was available in the permitting record or public record relating to alternatives analysis generally, and site alternatives in particular. For example, the NEC project participated in the New Jersey Long-Term Capacity Agreement Pilot Program (LCAPP) process prior to the Permit Application, in which other additional information was provided regarding alternatives, benefits and burdens of the NEC project. This information and the report summarizing the conclusions of the LCAPP Agent was a matter of public record at and before the time of the public comment period on the NEC Permit. The

LCAPP process was the subject of a number of public comments and NJDEP responses (in the Response to Comments), forming a part of the basis for the decision to issue the NEC permit. LCAPP is specifically discussed in Section 1.6 and 1.7 of this document. Information appearing in the permitting or public record is also included in Sections 2 and 3.

With regard to the Section 1.4, subparagraph 3., prior to submittal of the Permit Application, Hess NEC's owners had reviewed two other potential sites in New Jersey for power generation facilities: Pennsauken, and Port Reading. Hess NEC's owners also subsequently considered two additional alternate sites: Ringwood and Kearny. These reviews were instrumental to the decisions by Hess and EIF to proceed with the NEC project rather than an alternative site. The major factors used in this analysis were those referenced in the Permit Application as to why the Newark site was selected for development. This elaborated information is incorporated into Sections 2 and 3.

1.5 Purpose and Need for the Project

The purpose of the NEC project is to provide efficient and clean electricity to support the region's growing energy needs while reducing reliance on older, less efficient plants with higher pollutant emission rates. Studies completed by the regional transmission organization (RTO), PJM Interconnection (PJM), and others have indicated that there is a need for reliable and environmentally friendly electric generation capacity in the mid-Atlantic region, which includes the northern New Jersey area. This region is load-constrained, meaning that power demand within the region at times exceeds the generation capacity of facilities located in the region. To meet demand, the region must import sufficient amounts of reliable power from surrounding regions, which may not be economical and/or may be constrained by the capacity of existing transmission lines, or develop new generating sources locally.

1.6 Consistency with State Energy Plan Objectives

The NEC project is consistent with the objectives of the 2011 New Jersey State Energy Plan, which includes as stated goals the reduction of the cost of energy for all customers and the promotion of a diverse portfolio of new, clean in-state generation. The State Energy Plan also calls for the replacement of the aging electric generation fleet, consisting of many generating units that are no longer economical or environmentally compliant without the addition of expensive environmental retrofits. The NEC project's consistency with both of these objectives is described below.

1.6.1 Reduction in Energy Costs

New Jersey's goal of reducing the cost of energy for all customers is being addressed with the LCAPP. This program was designed to benefit New Jersey ratepayers by opening a bidding process among companies proposing to construct mid-merit and base-load electric generating units in New Jersey in order to increase the reliability of the regional power grid. The LCAPP law establishes that it is the policy of New Jersey to locate and construct new electric generating units in the state and that the benefits of that capacity outweigh any perceived environmental and social burdens. The LCAPP law was specifically established to promote the construction of base-load and mid-merit electric generation facilities for the benefit of New Jersey consumers.

The New Jersey Board of Public Utilities (NJBPU) selected an LCAPP agent (the Agent). That Agent, as noted in the LCAPP Agent's Report prepared for the NJBPU and published on March 21, 2011 (the Report), "formulated a multi-stage evaluation process consistent with the LCAPP law that [was] centered on the maximization of economic, environmental and community benefits from the standpoint of ratepayers in New Jersey." The LCAPP program, as noted in the Report, is anticipated to result in a savings of $1.8 Billion in wholesale energy costs over the 15-year contract period.

The Agent further determined that the recommended generators selected for contracts under the LCAPP program offer significant environmental benefits to New Jersey's electric customers. Those benefits, as noted in the Report, are ascribable to the displacement of incumbent generation with a portfolio of cleaner, more efficient natural gas-fired generation. The Agent estimated that implementation of the LCAPP would result in lower emissions of NO_x and SO_2 across the PJM region. As noted in the Report, net emissions of mercury will also be reduced regionally as well as locally in New Jersey.

The LCAPP has resulted in contract awards for three new in-state combined-cycle electric generation projects that use clean-burning natural gas, including the NEC project. The addition of the estimated 1,948.5 MW of capacity from the LCAPP process would displace incumbent generation with a portfolio of cleaner, more efficient natural gas-fired generation, with a significant net annual average reduction of pollutants and greenhouse gases.

By being selected as a participant in the LCAPP, the NEC project has demonstrated that it will provide clean and economic electricity, benefitting New Jersey ratepayers. It has also demonstrated that the benefits of the project, including economic benefits to

ratepayers significantly outweigh the burdens, which are *de minimis* given the clean and efficient nature of the NEC project and its location in an industrial area at a considerable distance from any residential area.

1.6.2 Replacement of Aging Infrastructure and Electric Generation Facility Retirements

In addition to the economic benefits ascribed to the selection of the NEC project as one of the LCAPP projects, the NEC project also addresses the State Energy Plan's stated concerns with the region's aging power generation fleet and the number of anticipated generation facility retirements due to new environmental regulations. As noted in the State Energy Plan, the region's aging fossil fuel plants are under increasing economic pressure due to age, energy prices and stricter environmental regulations. Many of the units are smaller (under 200 MW), fossil fuel-fired plants that are more than 40 years old and would require significant capital expenditures to enable continued operation. Expensive retrofits to meet new environmental regulations make operating and maintaining these units less economical leading to more plant retirements. Regulations requiring new environmental controls include the following:

- Section 316(b) of the Clean Water Act - requires that best available technology be used for cooling water intake structures, potentially necessitating extensive retrofits to existing plants that draw large volumes of cooling water from surface water bodies.

- Title 1 of the Clean Air Act – requires the application Maximum Achievable Control Technology for Hazardous Air Pollutants, potentially requiring extensive retrofits to existing coal- and oil-fired power plants.

- Interstate emissions cap-and-trade programs – require reduced emissions of SO_2 and NO_x across the eastern United States, potentially requiring additional retrofits to existing power plants.

- State Implementation Plan (SIP) Rules – Title 1 of the Clean Air Act requires states to submit plans to achieve compliance with the NAAQS for criteria pollutants. Previously implemented measures in New Jersey include rules that affect power generation, including High Energy Demand Day unit rules, that required retrofits to existing units on older, less efficient and higher emitting sources. Recently implemented and proposed new NAAQS are expected to lead to additional measures to reduce further emissions from older units.

Existing power plants for which the above retrofits would not be economically justified are expected to retire. Since 2003, approximately 1,150 MW of capacity have been retired in New Jersey, with an additional 654 MW of capacity expected to retire in 2013, according to the PJM 2010 Regional Transmission Expansion Plan Report.

The State Energy Plan notes that while estimates vary, there is general consensus that plant de-rates and retirements will reduce significantly the total capacity of older, less efficient and higher emitting power plants in PJM; estimates range from roughly 5 to 19 gigawatts (GW).

The 655-MW NEC project will help to replace electric generation capacity lost in the region as a result of these retiring units and future anticipated retirements.

Based on the above studies, Hess NEC focused its site selection process on locations with the ability to serve the northern New Jersey electric market in a manner that ensured that impacts would clearly be significantly outweighed by project benefits.

1.7 Long Term Capacity Agreement Pilot Program

In early 2011, the Governor of New Jersey signed a bill establishing the LCAPP. In accordance with the LCAPP, the NJBPU conducted a rigorous siting analysis that evaluated 34 proposed electric generating facilities, including the Newark alternative through a competitive bidding process. The NJBPU rated each facility on criteria such as site condition, proximity to sensitive resources, environmental justice issues, air quality impacts, and economic and community benefits.

Applicants, including Hess NEC, could prequalify under the bidding process by a showing of environmental, economic, and community benefits. The environmental criteria by which proposals were judged included:

- Relative proposed emissions of NO_x, SO_2, particulate matter, mercury, and greenhouse gases, and proposed control technology;
- Site condition and the site's proximity to sensitive natural and cultural resources;
- Water use and discharge; and
- Additional siting risks, such as environmental justice concerns not otherwise identified in the evaluation of other criteria.

Community and Economic criteria included:

- The presence of active support in the relevant community, or absence of opposition;
- Financial contributions to the community by the facility, in the form of taxes and other grants or subsidies; and
- Likelihood that the project would increase local employment.

Projects using previously developed areas that avoid impacts to natural resources were selected over undeveloped areas or areas near sensitive habitat. Projects with no emissions or using natural gas were selected over oil- or coal-fired projects. Projects involving no direct discharge to surface waters were selected over projects with direct discharges.

The analysis of economic and community benefits was equally rigorous. Bidders had to provide information to NJBPU that would allow the agency to conduct economic modeling to determine whether the project would benefit ratepayers. Bidders also had to demonstrate the extent of their planned financial contributions to the community in the form of taxes or payments in lieu of taxes, and grants or subsidies to the community. Bidders had to estimate total employment of local residents both directly and indirectly attributable to the project during construction and operation.

Of the 34 proposed projects requesting prequalification, NJBPU determined that nine projects satisfied the criteria and were permitted to proceed to final bidding. Six of the nine submitted final bids to NJBPU. After evaluation, NJBPU selected three winning bidders, including the NEC project.

NJBPU's evaluation concluded that construction of the three proposed facilities would reduce net emissions of pollutants by displacing existing, less efficient generation facilities and would add 2,400 job-years to the region during construction and the equivalent of 80 full-time jobs annually over the course of the facilities' operation. The LCAPP law thus establishes that it is the policy of New Jersey to locate and construct new electrical generating facilities in the state and that the benefits of that capacity significantly outweigh the burdens.

2. Site Selection Process

The purpose of the NEC project is to provide a nominal 655 MW of electricity to respond to regional energy needs using only clean-burning natural gas and state-of-the-art emissions control technology. As discussed above in Section 1.4, this Section 2 consolidates site selection information available in the Permit Application, permit decision record and public record and elaborates upon the information provided in the Permit Application about alternatives to the selected site in Newark that were considered by the principals in Hess NEC. This information about alternative sites is organized in the format of a screening analysis of the alternatives sites.

2.1 Identification of Site Alternatives

To elaborate the information about alternatives to the Newark Site that were previously considered by Hess NEC or its partners, this document includes four alternate sites within New Jersey for development of the project. A fifth site, Kearny, was added to provide an additional illustration of an alternate site and how it compares to Newark. This section also consolidates information from the permitting record or public record relevant alternative site information. The alternative sites were identified based on: proximity to natural gas and electric infrastructure; ability to serve the northern New Jersey market; and, compatible zoning and land use. The sites that were identified and evaluated are:

- Newark Alternative – Land consisting of approximately 25 acres located at 955 Delancy Street in the city of Newark, New Jersey, adjacent to the existing Hess Terminal in Newark. This site is shown on Figure 1.

- Kearny Alternative – Land consisting of three parcels, totaling approximately 25 acres, on the western end of Kearny Point in the town of Kearny, New Jersey. This site is shown on Figure 2.

- Port Reading Alternative – Land consisting of up to two parcels totaling approximately 73.5 acres, adjacent to the Hess Port Reading Refinery at 750 Cliff Road in Woodbridge Township, New Jersey. This site is shown on Figure 3.

- Pennsauken Alternative – Land consisting of up to approximately 100 acres adjacent to the existing Hess Terminal at 123 Derousse Avenue in Pennsauken Township, New Jersey. This site is shown on Figure 4.

- Ringwood Alternative – Up to approximately 100 acres of a larger parcel owned by the Borough of Ringwood, New Jersey in the Ringwood Industrial Park. This site is shown on Figure 5.

2.2 Development and Application of Site Suitability Criteria

For purposes of this Consolidated Alternative Site Information And Screening Analysis, **s**ite suitability criteria were formalized and applied to the alternate sites to determine their suitability. They are reflective of criteria used by Hess NEC and its owners in previously evaluating sites for electricity generation projects. The criteria considered included:

- Consistency with development objectives, including: the ability to serve the northern New Jersey electric market; land availability; suitability; and usability.
- Proximity to critical infrastructure, including: proximity to electric transmission infrastructure; proximity to natural gas infrastructure; and, the availability of process and cooling water.
- Environmental impact potential, including: air quality; wetlands and natural resources; and, proximity to residential land uses and other sensitive receptors.
- Community concerns, notably the presence of designated or qualifying Environmental Justice areas.

Each of these categories of criteria is discussed in the following subsections.

2.2.1 Consistency with Development Objectives

Each site's consistency with development objectives was evaluated with respect to the following criteria:

- Energy market served.
- Land availability and suitability, including ownership, zoning, available space and land use compatibility.

These criteria were applied to each site, as discussed in the following sections.

2.2.1.1 Energy Market

Hess NEC identified the PJM control area and energy market served by each site location. All of the sites are located within the PSEG control area in the PJM region with the exception of Ringwood, which is located in the Rockland Electric Company control area.

The purpose of the NEC project is to provide electric generation to respond to the demand for additional electricity in the energy-constrained market of the Newark/New York metropolitan area. Electricity is lost during transmission, and the amount of electricity that is lost increases as the length of the transmission line increases. Therefore, to provide the necessary power to the region from plants located far from the region, more electricity (and greater air emissions) would have to be generated to compensate for the transmission line power losses. Therefore, sites located in the heart of the load-constrained northern New Jersey energy market, requiring minimal additional transmission infrastructure, are considered more suitable.

The Newark and Kearny sites are located in the PSEG North zone that has historically been priced at a premium to other New Jersey markets owing to load requirements in the zone in tandem with limited power import capability. Port Reading and Pennsauken are in the PSEG South zone that has historically priced at a discount to the PSEG North zone – reflecting the greater power import capability and relatively lower value of adding generation to that area. Although physically within PSEG South, the Pennsauken site would interconnect with the grid via the PECO Energy (PECO) control zone. The Port Reading site is adjacent to the Sewaren power plant and the proposed CPV Woodbridge combined cycle power plant. The existence of these two power plants reduces the positive impact and economic benefit of an additional power plant in the same vicinity.

The Ringwood site is located in a constrained market, as reflected in pricing that, while below PSEG North zone pricing, is on average higher than that found in the rest of the state of New Jersey. Moreover, this location does not immediately serve the Newark or New York metropolitan energy markets. Finally, owing to its unique nature (serving Rockland Electric), the financial instruments generally used by single site (as opposed to portfolio) generators to manage risk are not available – thereby making the Ringwood site a significantly riskier development.

Therefore, the Newark and Kearny alternatives are preferred alternatives with regard to the energy market.

2.2.1.2 Land Availability and Suitability

Each of the five alternate sites was evaluated with respect to the availability, suitability, and usability of the land. Specifically, site ownership, zoning, available space, and current site conditions were considered.

Site Ownership – The Newark alternative is located on land controlled by Hess. The Kearny alternative is located on land owned by HP Real Estate LLC. The Port Reading and Pennsauken alternatives are located on land controlled by Hess. The Ringwood alternative is located on land owned by the Borough of Ringwood.

All else being equal, it is preferable to construct the project on land currently controlled by Hess. Therefore, the Newark, Port Reading, and Pennsauken alternatives are the preferred alternatives with regard to site ownership,

Zoning – Zoning represents a legal determination by a municipality that a given use is appropriate for a site. In the case of heavy industrial designations, the zoning for heavier industries typically includes consideration of road, rail and water access. Sites zoned for industrial use are generally not located near areas where they conflict with residents or other users. In the case of Newark, for example, the Newark Master Plan states:

> "Since such manufacturing activities are being forced out of communities in the region, and since they can produce high tax ratables and high paying jobs, their retention and possible expansion in Newark will continue to be an economic asset to the community."

The zoning of each site location was identified through review of municipal zoning maps and applicable zoning bylaws to determine if an energy generation project would be a permitted or conditional use, or if a zoning variance would be required. The Newark alternative is located in Newark's third industrial district (I-3); energy generation facilities are a permitted use in Newark's I-3 zone. The Kearny alternative is located in the South Kearny Industrial South (SKI-S) district; energy generation facilities are not a permitted or conditional use in this zone, and a use variance would be required. The Port Reading alternative is located in the Woodbridge Township Heavy Industrial (M-2) district and in a redevelopment overlay district; energy generation facilities are a permitted use in the M-2 district. The Pennsauken alternative is located in the Pennsauken Heavy Industrial (HI) district; all lawful uses not specifically excepted are permitted in this district and energy generation facilities would be considered a

permitted use. However, this zoning district requires certain yard size requirements for structures with heights greater than 65 feet and this site would, therefore, require a lot-size variance. The Ringwood alternative is located in the Ringwood's Industrial (I-60) district; energy generation facilities are not a permitted or conditional use in this zone, and a use variance would be required.

In order to maximize consistency with municipal planning objectives and obtain permits needed for construction without variances or zoning changes, it is preferable to locate the proposed project on a site where energy generation facilities are an expressly permitted use. Therefore, the Newark, Port Reading, and Pennsauken alternatives are the preferred alternatives with regard to zoning.

Available Space – The minimum area needed for development is estimated to be approximately 20 acres, preferably with at least 5 acres of buffer. Each site was determined to have adequate space for development. The Newark and Kearny sites each have approximately 25 acres of land available for development. The Port Reading, Pennsauken, and Ringwood locations each have over 70 acres of space available for development. Each alternative has sufficient land available for construction of the project, with the three larger sites offering more buffer potential.

Current Land Use – All locations with the exception of Ringwood are located on previously cleared and vacant land. The Ringwood alternative is located on a forested parcel in an industrially zoned area. To minimize project impacts to land, it is preferable to utilize a site on previously cleared land. Therefore, the Newark, Kearny, Port Reading, and Pennsauken alternatives are preferred with respect to current land use.

2.2.1.3 Conclusions on Consistency with Development Objectives

The Newark alternative is the preferred alternative with regard to the energy market, ownership, zoning, and existing land use.

The Kearny alternative is a viable alternative with regard to the energy market and existing land use. Siting in Kearny would, however, require a variance to the zoning regulations.

The Port Reading alternative is a viable alternative with regard to ownership, zoning, lot size, and existing land use. The Port Reading alternative, however, is not within the targeted energy market zone.

The Pennsauken alternative is a viable alternative for ownership, zoning, lot size, and existing land use. However, the Pennsauken alternative is too far from the energy market of the Newark and New York metropolitan areas to meet the project's stated purpose and need and to deliver the needed benefits of local generation capacity to northern New Jersey.

The Ringwood alternative is a viable alternative with regard to lot size. The Ringwood alternative is not located on land controlled by Hess, would require a zoning variance, is currently forested and not vacant.

The Newark and Kearny alternatives are acceptable locations based on the consistency with development objectives criteria. The Newark alternative is the preferred location with respect to these criteria due to the fact that the site is currently controlled by Hess and power plants are a permitted use.

Table 2 summarizes the results of the evaluation of consistency with development objectives.

Table 2. Site Suitability Based on Consistency with Development Objectives

Criteria	Newark Alternative	Kearny Alternative	Port Reading Alternative	Pennsauken Alternative	Ringwood Alternative
PJM Control Zone	PSEG North	PSEG North	PSEG South	PSEG South/PECO	Rockland Electric
Energy Market	Newark / New York	Newark / New York	North / Central Jersey	Philadelphia / Camden	North Jersey
Ownership	Hess	HP Real Estate LLC	Hess	Hess	Borough of Ringwood
Acreage	25	25	73.5	~100	>100
Zoning District	I3 – Industrial	SKIS-S – Industrial	M-2 – Heavy Industrial and KPR96 – Redevelopment	HI – Heavy Industrial	I-60 – Industrial
Permitted Use?	Yes	No - A use variance would be required	Yes	Yes, but height restrictions would result in the need for a lot-size variance	No – A use variance would be required
Existing Use	Vacant	Vacant	Vacant	Vacant	Forested

2.2.2 Proximity to Critical Infrastructure

Hess NEC evaluated each site's proximity to critical infrastructure to determine at a screening level whether, and to what extent, new ancillary facilities would need to be constructed. Infrastructure considered included:

- Proximity to electric transmission infrastructure;
- Proximity to natural gas supply; and,
- Availability of process and cooling water.

2.2.2.1 Electric Transmission Infrastructure

To minimize power line losses and required transmission enhancements, sites that are closer to electrical load are preferred to sites further from load. The Newark and Kearny alternatives are closest to the target market of the Newark/New York metropolitan area. The Port Reading and Ringwood alternatives are located further from the majority of electrical load, but with the ability to serve the Newark/New York metropolitan area.

The Newark alternative would tie into the PSEG Essex Substation approximately 2 miles north of the site. This electrical interconnection would require the following improvements:

- Construction of a 2-mile interconnection along Doremus Avenue.

The Kearny alternative would also tie into the PSEG substation located within 2 miles north of the site. This electrical interconnection would require the following improvements:

- Construction of an approximately 2-mile interconnection, including a crossing of the Passaic River, which is designated as a Superfund site in this area.

The Port Reading alternative would tie into the substation associated with the nearby PSEG Sewaren Generating Station located adjacent to, but on the opposite side, of the Port Reading Refinery. This electrical interconnection would require the following improvements:

- Construction of an approximately 0.25 mile interconnection, primarily crossing Hess property.

The Pennsauken alternative would tie into the substation associated with the Richmond Generating Station located directly across the Delaware River. This electrical interconnection would require the following improvements:

- Construction of an approximately 0.75-mile interconnection, including a crossing of the Delaware River.

The Ringwood alternative would tie into the electric transmission lines located directly adjacent to the site. This electrical interconnection would require the following improvements.

- Construction of a new electrical interconnection substation or significant expansion of the existing substation serving the Ringwood Industrial Park.

To minimize construction costs and land impacts, it is preferable to site the project in a location which minimizes the distance and difficulty of electrical interconnection. Therefore, the Newark and Port Reading alternatives are preferred alternatives with regard to electrical interconnection.

2.2.2.2 Availability of Natural Gas

Each site's proximity to natural gas delivery systems and the extent to which new gas pipelines and ancillary facilities would need to be constructed was evaluated.

The Newark alternative would tie into an existing natural gas pipeline located approximately 500 feet south of the site; this pipeline connects to a Transco interstate pipeline 1 mile west of the site, which has sufficient natural gas capacity for the project's energy needs. This natural gas interconnection would require the following improvements:

- New interconnection to the existing pipeline located within 500 feet of the site.

The Kearny site would tie into an existing Transco pipeline located approximately 1 mile north of the site. This natural gas interconnection would require the following improvements:

- Construction of a new 1-mile natural gas lateral through a heavy industrial area, including multiple Superfund sites.

The Port Reading Refinery is located adjacent to the Port Reading alternative. The refinery is served through a TETCO lateral and a Transco pipeline is located on the southwest side of the refinery. The existing TETCO lateral has insufficient capacity to serve a new power plant. This natural gas interconnection would require the following improvements:

- Lengthy new interconnection to reach a pipeline with sufficient excess capacity.

The Pennsauken alternative would tie into an existing Transco natural gas pipeline that crosses a portion of the site.

The Ringwood Industrial Park is currently served by PSEG, but the existing connection would not have sufficient capacity for a new generating station. A Millennium/Transco pipeline 6 miles from the site, across the state line in New York, would be the closest interconnection point. This natural gas interconnection would require the following improvements:

- Construction of a new lateral, approximately 6 miles in length across the New York/New Jersey State line.

To minimize construction costs and land impacts, it is preferable to site the project in a location which minimizes the distance and difficulty of natural gas interconnection. Therefore, the Newark and Pennsauken alternatives are the preferred alternatives with regard to natural gas interconnection.

2.2.2.3 Availability of Cooling Water

In order to capture the efficiency, cost, and noise-related benefits associated with using water for cooling, the availability of water at each site for cooling purposes was evaluated. To avoid environmental impacts related to the use of groundwater or surface water for cooling, the availability of treated effluent from municipal or private sources was most desirable.

The Newark alternative would use treated effluent from the Passaic Valley Sewerage Commission (PVSC) to meet process and cooling needs. PVSC has sufficient

capacity to supply water to this site. This water connection would require the following improvements:

- Construction of new water supply line and return line to and from the site and the PVSC located approximately 0.25 mile north of the site.

The Kearny alternative would also use treated effluent from PVSC. PVSC has sufficient capacity to supply water to this site. This water connection would require the following improvements:

- Construction of a new water supply line across the Passaic River, parts of which are designated as a Superfund site. An existing sewer connection is expected to have sufficient capacity for the return of wastewater to PVSC.

The Port Reading alternative would seek water from the Middlesex County Utilities Authority (MCUA), which already supplies the refinery with 55 million gallons per month of potable water. This water connection would require the following improvements:

- Construction of an approximately 5-mile new water supply line and return line, including crossing the Raritan River.

The Pennsauken alternative would seek water from the Camden County Municipal Utilities Authority. This water connection would require the following improvements:

- Construction of an approximately 5-mile new water supply line and return line through heavily developed areas.

The Ringwood alternative is not located near a large source of treated effluent. Surface water from the Monksville or Wanaque Reservoirs, each located less than 1 mile from the site, would be required to provide sufficient water for process and cooling needs.

To minimize construction costs and land impacts, it is preferable to site the project in a location which minimizes the distance and difficulty of water connection. In addition, reuse of treated effluent is preferable from a resource conservation standpoint. Therefore, the Newark alternative is the preferred alternative with regard to water supply.

2.2.2.4 Conclusions on Proximity to Critical Infrastructure

The Newark alternative is the preferred alternative with regard to infrastructure proximity. The Kearny alternative is a less viable alternative; electrical, natural gas, and water connections are feasible, but would require construction across heavily developed areas and involve multiple crossings of the Passaic River, which is designated as a Superfund site in that area. The Port Reading alternative is less viable as the availability of natural gas and water supplies to the site may not be sufficient for the project without significant improvements, including a lengthy new connection to the MCUA.

The Pennsauken alternative is also a less viable alternative. Electrical interconnection is feasible but would involve crossing the Delaware River. The water connection is feasible, but may require construction across approximately 5 miles of heavily developed areas. The Ringwood alternative would require construction of a new electrical substation and a 6-mile natural gas pipeline. The Ringwood alternative is also not located near a large source of treated effluent and would need to rely on less preferable reservoir sources of water.

Table 3 summarizes the results of the evaluation of proximity to critical infrastructure.

Table 3. Site Suitability Based on Proximity to Critical Infrastructure

Criteria	Newark Alternative	Kearny Alternative	Port Reading Alternative	Pennsauken Alternative	Ringwood Alternative
Proximity to Electrical Interconnect	2.3 miles	~2 miles; Passaic River crossing	<0.1 mile	<1 mile; Delaware River crossing	<0.1 mile, but no obvious substation
Natural Gas Availability	<0.1 mile	1 mile	On site, but limited	On site	6 miles
Potential Water Sources	PVSC; 0.25 miles	PVSC; 0.5 miles across Passaic River	Middlesex County Utilities Authority; 5 miles across Raritan River	Camden County Utilities Authority; 5 miles	Monksville or Wanaque Reservoirs; 1 mile

2.2.3 Environmental Impact Potential

Each site was evaluated with respect to environmental impact potential, as discussed in the following sections.

2.2.3.1 Air Quality

The alternative sites are located in Essex County (Newark), Hudson County (Kearny), Middlesex County (Port Reading), Camden County (Pennsauken), and Passaic County (Ringwood). These counties are all designated as nonattainment areas with respect to the NAAQS and New Jersey Ambient Air Quality Standards (NJAAQS) for ozone and fine particulates ($PM_{2.5}$).

The entire state of New Jersey is currently designated as nonattainment for ozone, and major portions of New Jersey are currently designated as nonattainment for $PM_{2.5}$. However, the NEC project is not subject to Nonattainment New Source Review for $PM_{2.5}$ because it is too small a source. Alternative site analyses must, therefore, be considered primarily in the context of ozone nonattainment.

Ozone nonattainment is considered a regional issue, as NO_x and VOC react in the atmosphere to form ozone over time. During that time, winds transport the ozone and its precursor pollutants well downwind away from the precursor sources. Since ozone is a result of emissions transported downwind from combustion sources (including out-of-state coal-fired power plants), siting power generation anywhere within New Jersey would have similar impacts with respect to ozone nonattainment.

Although the NEC project is subject to Nonattainment New Source Review for only ozone, the alternative site analysis also considered potential impacts on $PM_{2.5}$ nonattainment. Similarly as for ozone, siting the facility in any part of the $PM_{2.5}$ nonattainment area would have similar impact on the area's attainment status because a wide region is designated nonattainment. In addition, sources well upwind of the Newark/New York metropolitan area also contribute significantly to $PM_{2.5}$ levels in the nonattainment area through emissions of precursor pollutants, such as NO_x, that contribute to secondary formation of particulates, such as nitrates, through a series of chemical reactions that take place over long distances. Therefore, each proposed alternative site is expected to have similar air quality impact potential.

2.2.3.2 Wetlands and Natural Resources

Each site is located on currently vacant land with minimal wetland presence based upon mapping data provided through the NJDEP i-MapNJ online mapping tool, with the exception of the Ringwood alternative. The Ringwood alternative is located on a forested parcel with multiple wetlands and streams. Due to the size of the parcel, however, it is likely that impacts to wetlands could be minimized by careful site design.

The Ringwood alternative is also located within the Highlands Preservation Area, and would require a Highlands Preservation Area Approval from NJDEP for construction. The Ringwood alternative is also the only alternative located in an area with potential habitat for protected species.

The Newark, Kearny, Port Reading, and Pennsauken alternatives are preferred with regard to natural resources. The Ringwood alternative is considerably less suitable with respect to this criterion.

2.2.3.3 Sensitive Receptor Proximity

The nearest residential receptors to the Newark alternative are located approximately 1.0 mile east of the site and 1.5 miles north and west of the site. A prison is located approximately 0.8 mile north of the site.

The nearest residential receptors to the Kearny alternative are located approximately 0.7 mile to the southeast of the site. The prison (referenced in the above Newark receptor discussion) is located approximately 0.5 mile west of the Kearny site.

The nearest residential receptors to the Port Reading alternative are located approximately 0.5 mile north of the site.

The nearest residential receptors to the Pennsauken alternative are located approximately 0.4 mile south and east of the site.

The nearest residential receptors to the Ringwood alternative are located adjacent to the selected parcel, with residential receptors likely within 1,000 feet of any selected construction area.

While all of the sites are well buffered from residences, the Newark alternative is located the furthest distance from sensitive land uses and is, therefore, considered the preferred alternative with respect to sensitive receptors.

2.2.3.4 Conclusions on Environmental Impact Potential

All of the alternatives are considered to have similar impact potential with respect to air quality. The Ringwood alternative is considerably less suitable than any of the other alternatives with respect to natural resource impacts, as it is located in a forested area designated as a preservation area which may contain habitat for protected species.

The Newark, Kearny, Port Reading, and Pennsauken alternatives are considered preferred alternatives with regard to environmental impacts. Table 4 summarizes the results of the evaluation of environmental impact potential.

Table 4. Site Suitability Based on Environmental Impact Potential

Criteria	Newark Alternative	Kearny Alternative	Port Reading Alternative	Pennsauken Alternative	Ringwood Alternative
Wetlands	Minimal	Minimal	Minimal	<5 percent, located on fill, avoidable	<5 percent, avoidable
Sensitive Receptors	0.8 mile north (prison)	0.5 mile west (prison)	0.5 mile north (residences)	0.4 mile south and east (residences)	<1,000 feet, south and east (residences)
Residential Receptors	1.0 mile east	0.7 mile southeast	0.5 mile north	0.4 mile south and east	<1,000 feet, south and east
Air Quality	Nonattainment for ozone and particulates	Nonattainment for ozone and particulates	Nonattainment for ozone and particulates	Nonattainment for ozone and particulates	Nonattainment for ozone and particulates

2.2.4 Environmental Justice Community Proximity

The United States Environmental Protection Agency's (USEPA's) EJView mapping tool was used to compare the demographic information of census block groups with USEPA Region 2's demographic criteria for potential environmental justice communities. Potential environmental justice communities were identified by 2010 census block groups with greater than 18.58 percent below poverty level or greater than 48.52 percent minority populations in urban areas or 29.39 percent in rural areas (Ringwood alternative). As shown in Table 5, the majority of census block groups in the areas surrounding each alternative site, with the exception of the Ringwood alternative, meet the criteria for potential environmental justice areas. Although the EJView mapping does not identify an EJ community near the Ringwood alternative, a community descended from American Indian and European parents exists near the site. Depending on the criteria used to identify EJ communities, USEPA or NJDEP might require consideration of this community.

The Ringwood alternative is not located near any mapped environmental justice communities and is, therefore, the preferred alternative with respect to this criterion. The remaining sites are located within and proximate to environmental justice areas. However, given the land use characteristics of those sites and the separation distance to residential and other sensitive areas (see Table 4), significant adverse impacts to residential areas within any of those environmental justice communities would not be expected.

Table 5. Site Suitability Based on Environmental Justice Community Proximity

Criteria	Newark Alternative	Kearny Alternative	Port Reading Alternative	Pennsauken Alternative	Ringwood Alternative
Environmental Justice Community Proximity	Located in and near (Newark, Kearny, and Jersey City)	Located in and near (Kearny, Newark, Jersey City)	Located in and near (Woodbridge, Port Reading)	Located in and near (Pennsauken, Camden, Philadelphia)	None nearby

3. Conclusions on Site Selection

This Section 3 confirms the basis for concluding in the Permit Application and in the Response to Comments that the Newark site was the most suitable site for developing the project. It summarizes the information about all five alternative sites and shows that Newark was the most suitable location for this project.

The Newark and Kearny alternatives are viable locations based on the consistency with development objectives criteria as they are the locations most able to supply the target energy market. The Newark alternative is the more preferred location based on the development objectives consistency criteria due to the fact that the site is currently controlled by Hess and electric generation is an allowed use under current zoning.

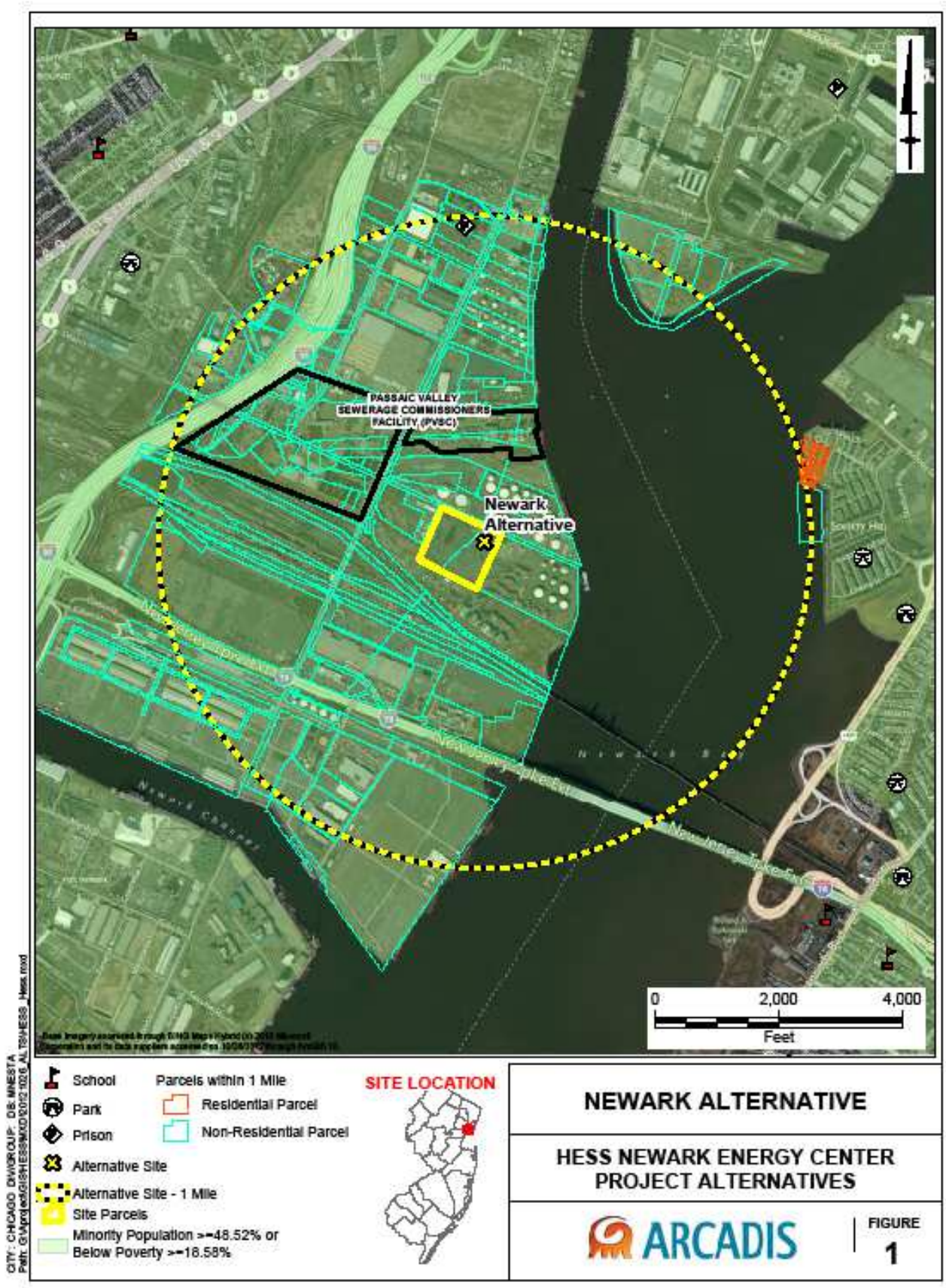
The Newark alternative is the preferred alternative with regard to infrastructure proximity with available natural gas and treated effluent immediately proximate to the site and no major water body crossings necessary for electric, gas or water interconnection.

The Newark, Kearny, Port Reading, and Pennsauken alternatives are all considered viable alternatives with regard to the environmental impact potential criteria. The Ringwood Alternative is considerably less suitable with respect to natural resource impact potential, as it is located in a forested area designated as a preservation area, and which potentially contains habitat for protected species.

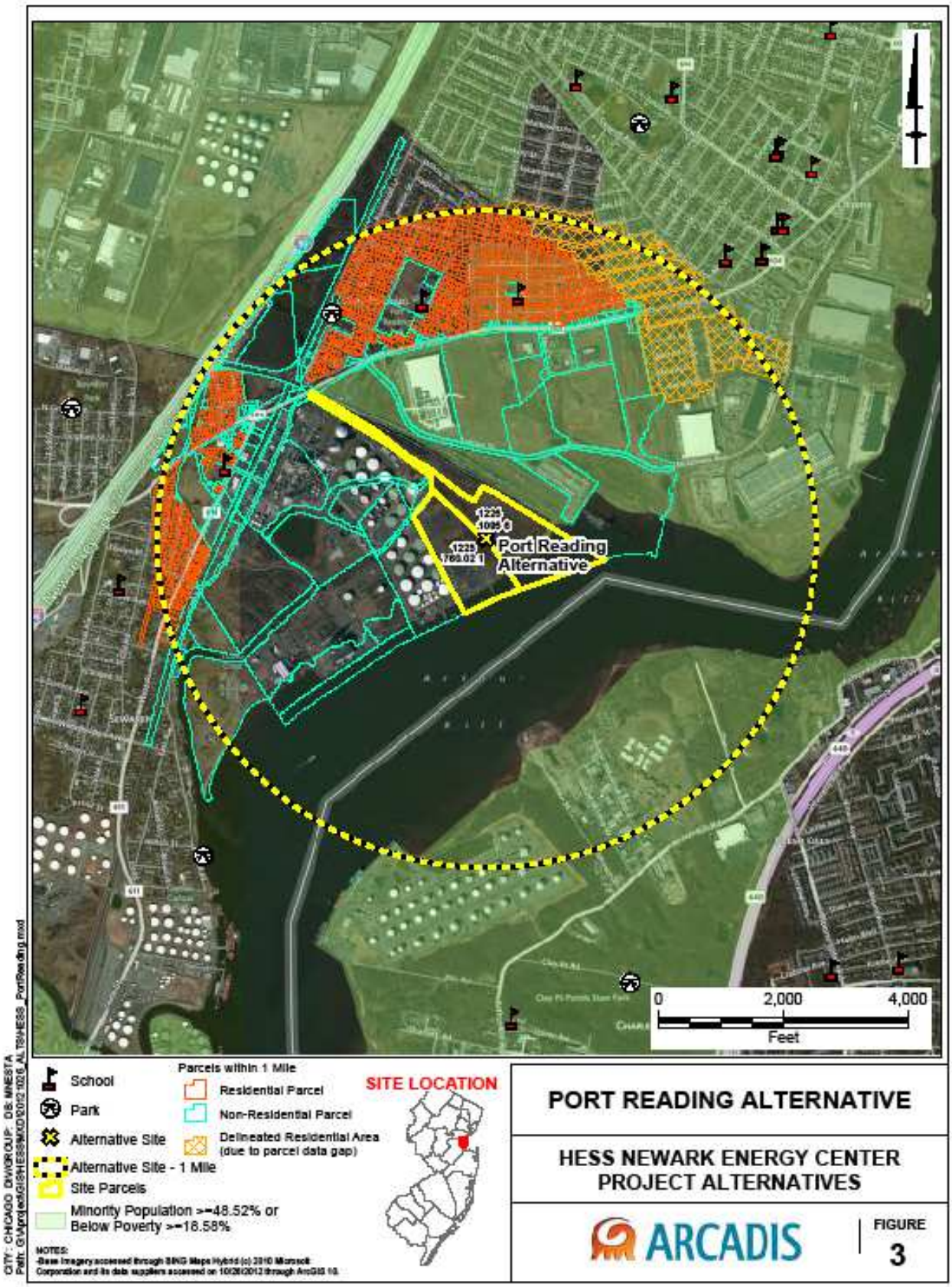
The Ringwood alternative is not located near any mapped environmental justice communities, and is, therefore, superior to the other sites with respect to this criterion. The Newark, Kearny, Port Reading and Pennsauken alternatives are all proximate to qualifying environmental justice communities, although none would be expected to result in a significant adverse impact to residential areas within those communities.

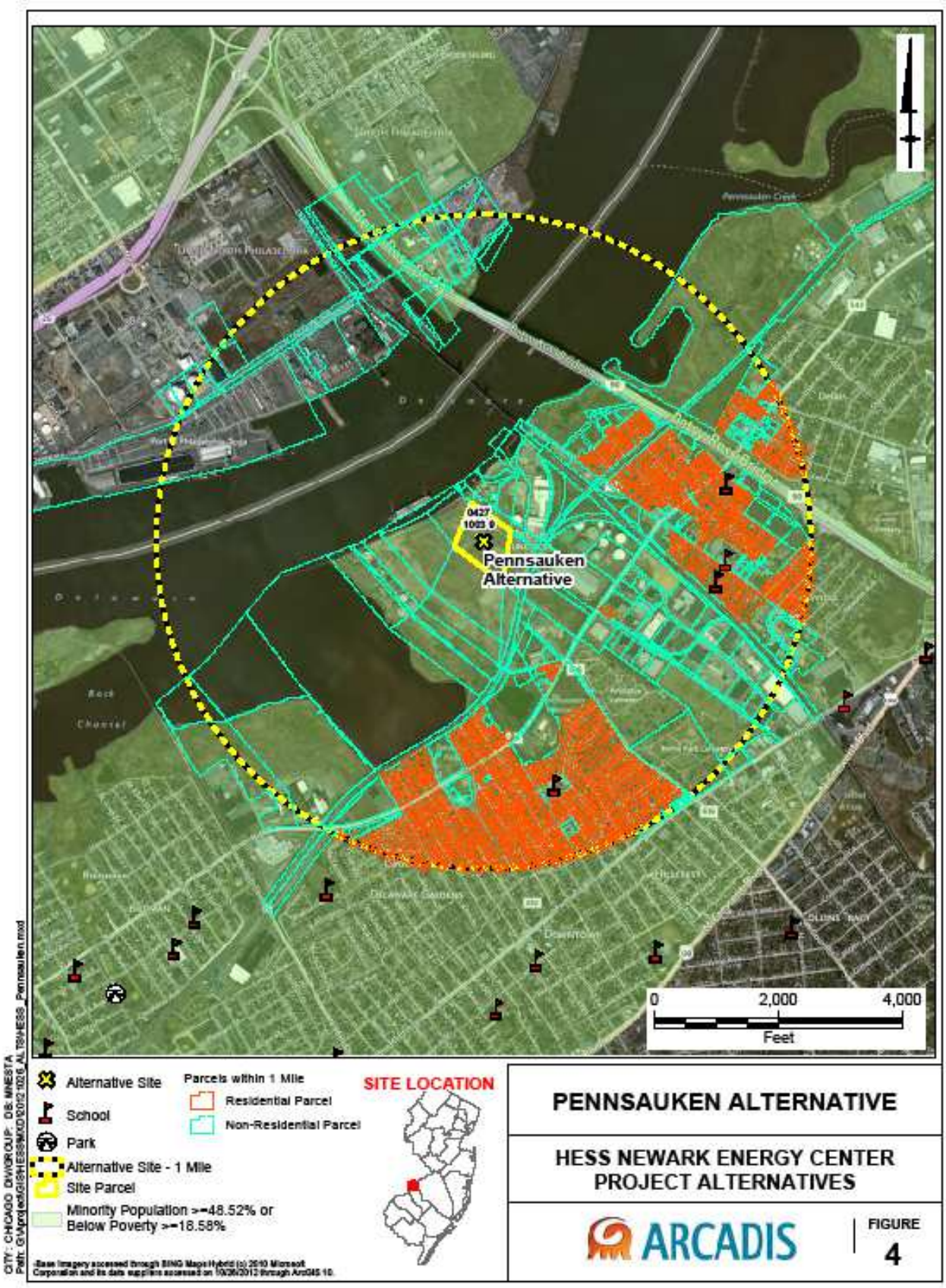
The Newark alternative is the preferred alternative based upon the availability of sufficient natural gas and electric transmission infrastructure and water supplies without river crossings or lengthy supply routes, Hess ownership, compatible zoning and land use, and because it is the greatest distance from the nearest sensitive receptors. These were the factors identified in Section 2.7.1 of the Permit Application as forming the basis for selection of the Newark site for the NEC project.

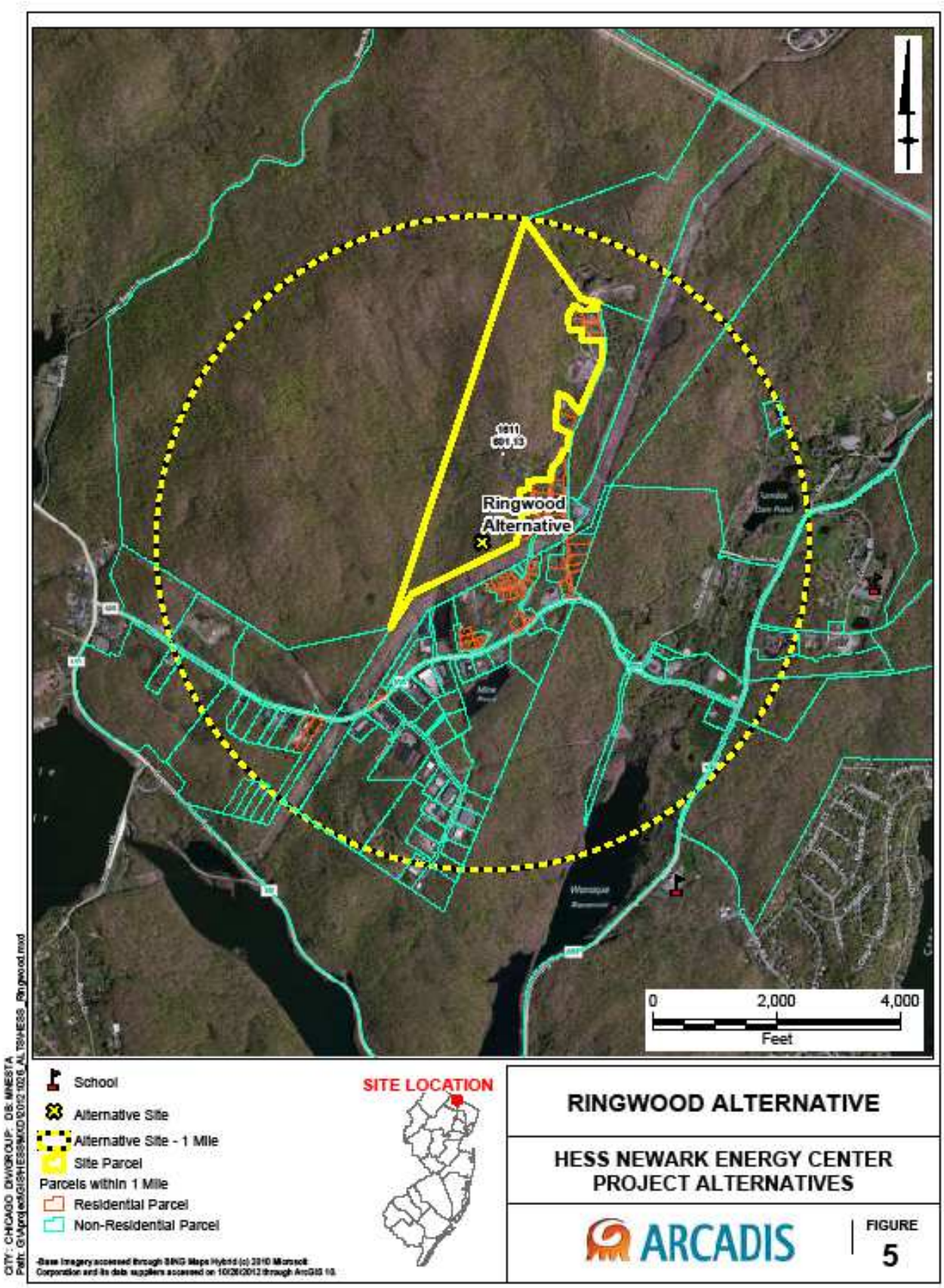
Figures


PASSAIC VALLEY SEWERAGE COMMISSIONERS FACILITY (PVSC)
Newark Alternative
0
2,000
4,000
Feet
School
Park
Prison
Alternative Site
Alternative Site - 1 Mile
Site Parcels
Minority Population >=48.52% or Below Poverty >=18.58%
Parcels within 1 Mile
Residential Parcel
Non-Residential Parcel
SITE LOCATION
NEWARK ALTERNATIVE
HESS NEWARK ENERGY CENTER PROJECT ALTERNATIVES
ARCADIS
FIGURE 1


Kearny Alternative
0807 208 3
0807 208 2
0807 208 1
0
2,000
4,000
Feet
School
Park
Prison
Alternative Site
Alternative Site - 1 Mile
Site Parcels
Minority Population >=48.52% or Below Poverty >=18.58%
Parcels within 1 Mile
Residential Parcel
Non-Residential Parcel
SITE LOCATION
KEARNY ALTERNATIVE
HESS NEWARK ENERGY CENTER PROJECT ALTERNATIVES
ARCADIS
FIGURE 2


Port Reading Alternative
0
2,000
4,000
Feet
School
Park
Alternative Site
Alternative Site - 1 Mile
Site Parcels
Minority Population >=48.52% or Below Poverty >=18.58%
Parcels within 1 Mile
Residential Parcel
Non-Residential Parcel
Delineated Residential Area (due to parcel data gap)
SITE LOCATION
PORT READING ALTERNATIVE
HESS NEWARK ENERGY CENTER PROJECT ALTERNATIVES
ARCADIS
FIGURE 3


0427
1023 0
Pennsauken Alternative
0
2,000
4,000
Feet
Alternative Site
School
Park
Alternative Site - 1 Mile
Site Parcel
Minority Population >=48.52% or Below Poverty >=18.58%
Parcels within 1 Mile
Residential Parcel
Non-Residential Parcel
SITE LOCATION
PENNSAUKEN ALTERNATIVE
HESS NEWARK ENERGY CENTER PROJECT ALTERNATIVES
ARCADIS
FIGURE
4


Ringwood Alternative
0
2,000
4,000
Feet
School
Alternative Site
Alternative Site - 1 Mile
Site Parcel
Parcels within 1 Mile
Residential Parcel
Non-Residential Parcel
SITE LOCATION
RINGWOOD ALTERNATIVE
HESS NEWARK ENERGY CENTER
PROJECT ALTERNATIVES
ARCADIS
FIGURE
5